PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

(PCT Article 36 and Rule 70)

14

Applicant's or agent's file reference	FOR FURTHER ACTION	See Notification of Transmittal of International Preliminary Examination Report (Form PCT/IPEA/416)
JV/FR/P32333		
International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/EP00/05466	13/06/2000	21/06/1999
International Patent Classification (IPC) or national classification and IPC C07D401/06		
Applicant SMITHKLINE BEECHAM P.L.C. et al.		

1. This international preliminary examination report has been prepared by this International Preliminary Examining Authority and is transmitted to the applicant according to Article 36.

2. This REPORT consists of a total of 7 sheets, including this cover sheet.

   ☒ This report is also accompanied by ANNEXES, i.e. sheets of the description, claims and/or drawings which have been amended and are the basis for this report and/or sheets containing rectifications made before this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions under the PCT).

   These annexes consist of a total of 8 sheets.

3. This report contains indications relating to the following items:

   - I ☒ Basis of the report
   - II ☐ Priority
   - III ☒ Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
   - IV ☐ Lack of unity of invention
   - V ☒ Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations suporting such statement
   - VI ☐ Certain documents cited
   - VII ☐ Certain defects in the international application
   - VIII ☒ Certain observations on the international application

Date of submission of the demand	Date of completion of this report
13/12/2000	26.07.2001
Name and mailing address of the international preliminary examining authority: European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized officer Fazzi, R Telephone No. +49 89 2399 8510

Form PCT/IPEA/409 (cover sheet) (January 1994)

INTERNATIONAL PRELIMINARY EXAMINATION REPORT

International application No. PCT/EP00/05466

I. Basis f th r port

1. With regard to the **elements** of the international application *(Replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report since they do not contain amendments (Rules 70.16 and 70.17))*:
Description, pages:

1-37	as originally filed				

Claims, No.:

1-13	as received on	15/06/2001	with letter of	15/06/2001	

2. With regard to the **language**, all the elements marked above were available or furnished to this Authority in the language in which the international application was filed, unless otherwise indicated under this item.

   These elements were available or furnished to this Authority in the following language: , which is:

   - ☐ the language of a translation furnished for the purposes of the international search (under Rule 23.1(b)).
   - ☐ the language of publication of the international application (under Rule 48.3(b)).
   - ☐ the language of a translation furnished for the purposes of international preliminary examination (under Rule 55.2 and/or 55.3).

3. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, the international preliminary examination was carried out on the basis of the sequence listing:

   - ☐ contained in the international application in written form.
   - ☐ filed together with the international application in computer readable form.
   - ☐ furnished subsequently to this Authority in written form.
   - ☐ furnished subsequently to this Authority in computer readable form.
   - ☐ The statement that the subsequently furnished written sequence listing does not go beyond the disclosure in the international application as filed has been furnished.
   - ☐ The statement that the information recorded in computer readable form is identical to the written sequence listing has been furnished.

4. The amendments have resulted in the cancellation of:

   - ☐ the description, pages:
   - ☐ the claims, Nos.:
   - ☐ the drawings, sheets:

5. ☐ This report has been established as if (some of) the amendments had not been made, since they have been considered to go beyond the disclosure as filed (Rule 70.2(c)):

(Any replacement sheet containing such amendments must be referred to under item 1 and annexed to this report.)

6. Additional observations, if necessary:
see separate sheet

III. Non-establishment of opinion with regard to novelty, inventive step and industrial applicability

1. The questions whether the claimed invention appears to be novel, to involve an inventive step (to be non-obvious), or to be industrially applicable have not been examined in respect of:

☐ the entire international application.

☒ claims Nos. 11.

because:

☒ the said international application, or the said claims Nos. 11, with respect to industrial applicability relate to the following subject matter which does not require an international preliminary examination (*specify*):
see separate sheet

☐ the description, claims or drawings (*indicate particular elements below*) or said claims Nos. are so unclear that no meaningful opinion could be formed (*specify*):

☐ the claims, or said claims Nos. are so inadequately supported by the description that no meaningful opinion could be formed.

☐ no international search report has been established for the said claims Nos. .

2. A meaningful international preliminary examination cannot be carried out due to the failure of the nucleotide and/or amino acid sequence listing to comply with the standard provided for in Annex C of the Administrative Instructions:

☐ the written form has not been furnished or does not comply with the standard.

☐ the computer readable form has not been furnished or does not comply with the standard.

V. Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	1-13
	No:	Claims	
Inventive step (IS)	Yes:	Claims	8
	No:	Claims	1-7 and 9-13
Industrial applicability (IA)	Yes:	Claims	1-10 and 12-13

No: Claims

2. Citations and explanations
see separate sheet

VIII. Certain observations on the international application

The following observations on the clarity of the claims, description, and drawings or on the question whether the claims are fully supported by the description, are made:
s e separate sheet

1) Reference is made to the following documents:

D1: GB-A-1 496 371

D2: KAYIRERE M-G. ET AL: 'Synthesis and antibacterial activity of new 4-alkoxy, 4-aminoalkyl and 4-alkylthioquinoline derivatives' EUROPEAN JOURNAL OF MEDICINAL CHEMISTRY. CHIMICA THERAPEUTICA., vol. 33, no. 1, 1998 pages 55-63, XP004173056 EDITIONS SCIENTIFIQUE ELSEVIER, PARIS., FR ISSN: 0223-5234

1.1) Amendments (Reference to section I.6)

The amendments filed with the letter dated 15/06/2001 do not introduce any subject-matter which extends beyond the content of the application as filed, so as to comply with the requirements of Article 34(2)(b) PCT.
The amendments concerned are the following:
- the definitions of Z^1 to Z^5 have been amended in order to bring them in line with page 1, lines 19-20; the original definitions now form the basis of new claim 2;
- the term "optionally" has been inserted in claim 1 in the definition of R^3.

2) Rule 67(1)(i)-(vi), Subject Matter Under Article 34(4)(a)(i) PCT (Referenc to section III)

Claim 11, disclosing a method of treatment of bacterial infections, relates to subject-matter considered by this Authority to be covered by the provisions of Rule 67.1(iv) PCT. Consequently, no opinion will be formulated with respect to the industrial applicability of the subject-matter of this claim (Article 34(4)(a)(i) PCT).

3) Clarity (Article 6 PCT, reference to section VIII)

Claims 1 and 4 do not meet the requirements of Article 6 PCT in that the matter for which protection is sought is not clearly defined.
First of all the terms "heterocyclylthio", "heterocyclyloxy", "arylthio", "aryloxy", "arylsulphonyl", "arylsulphoxide", "heteroaryl or heteroaryl(C_{1-2})alkyl", "heteroaroyl or heteroaroylmethyl" and "optionally substituted" (cf. definition of R^4 and claim 4 for this last expression) used in claim 1 and throughout the whole description are vague and unclear

and leave the reader in doubt as to the meaning of the technical features to which they refer, thereby rendering the definition of the subject-matter of said claim unclear (Article 6 PCT).
Secondly, for what concerns claim 4 , dependent on claim 1, the Examiner agrees with the Applicant's specifications (cf. reply to the Written Opinion). Nevertheless, for clarity reasons it would be better to separate the different R^3 substituents with a semicolon; in this case it is still not clear i.a. whether the group hydroxy(C_{1-6})alkyl represents a variant for R^3 or a substituent of the amino group.

4) The present application discloses compounds of general formula I useful against bacterial infections.

5) Novelty (Reference to section V)

D1 relates to 4-amino-quinolone derivatives; D2 describes 4-alkoxy, 4-aminoalkyl and 4-alkylthioquinoline derivatives. Both documents do not disclose compounds such as those presently claimed.

Accordingly present claims 1-13 meet the requirements of Article 33(2) PCT.

6) Inventive step (Reference to section V)

The problem to be solved by the present application may be regarded as the provision of alternative compounds with antibacterial activity.
Both documents D1 and D2 can be considered to represent the closest prior art.
No indication has been found in these documents which would encourage the man skilled in the art to arrive to the solution proposed in present claim 1 (namely compounds of general formula I). The Applicant has also provided data concerning the biological activity of compounds of examples 1-40 (cf. page 37) which is a support for a non-obviousness of present claim 1.
Nevertheless it is reminded that the breadth of the main claim should be such that it represents a reasonable generalisation over the examples provided, and should also be supported by the description. In the present case, having regard to the limited number of exemplified variants and to the few tested compounds (**not all functional groups hav been test d**), it is questionable whether the scope of claim 1 is reasonable and justified.

As not all the variants disclosed in claim 1 can considered as representing an interchangeable solution to the above-mentioned technical problem, an inventive step can be recognized only for claim 8 for which experimental data are shown.
Consequently claims 1-7 and 9-13 do not meet the criteria of article 33(3) PCT.

7) Industrial applicability (Reference to section V)

For the assessment of the present claim 11 on the question whether it is industrially applicable, no unified criteria exist in the PCT Contracting States. The patentability can also be dependent upon the formulation of the claim. The EPO, for example, does not recognize as industrially applicable the subject-matter of claims to the use of a compound in medical treatment, but may allow, however, claims to a known compound for first use in medical treatment and the use of such a compound for the manufacture of a medicament for a new medical treatment.

PATENT COOPERATION TREATY

From the INTERNATIONAL BUREAU

PCT

NOTIFICATION OF ELECTION

(PCT Rule 61.2)

To:

Commissioner
US Department of Commerce
United States Patent and Trademark
Office, PCT
2011 South Clark Place Room
CP2/5C24
Arlington, VA 22202
ETATS-UNIS D'AMERIQUE

in its capacity as elected Office

Date of mailing (day/month/year) 08 February 2001 (08.02.01)	
International application No. PCT/EP00/05466	**Applicant's or agent's file reference** JV/P32333
International filing date (day/month/year) 13 June 2000 (13.06.00)	**Priority date** (day/month/year) 21 June 1999 (21.06.99)
Applicant DAVIES, David, Thomas et al	

1. The designated Office is hereby notified of its election made:

[X] in the demand filed with the International Preliminary Examining Authority on:

13 December 2000 (13.12.00)

[ ] in a notice effecting later election filed with the International Bureau on:

2. The election [X] was

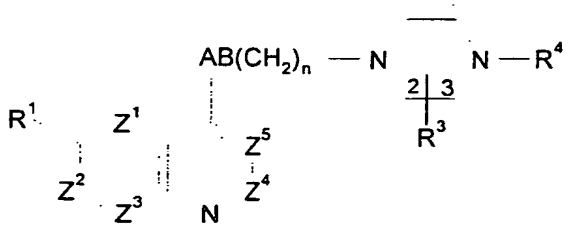
[ ] was not

made before the expiration of 19 months from the priority date or, where Rule 32 applies, within the time limit under Rule 32.2(b).

The International Bureau of WIPO **34, chemin des Colombettes** **1211 Geneva 20, Switzerland**	Authorized officer Juan Cruz
Facsimile No.: (41-22) 740.14.35	Telephone No.: (41-22) 338.83.38

Claims

1. A compound of formula (I) or a pharmaceutically acceptable derivative thereof:



(I)

wherein:

one of Z^1, Z^2, Z^3, Z^4 and Z^5 is N and one of Z^3 and Z^5 if not N is CR^{1a} and the remainder are CH, or one of Z^1, Z^2, Z^3, Z^4 and Z^5 is CR^{1a} and the remainder are CH;

R^1 is selected from hydroxy; (C_{1-6}) alkoxy optionally substituted by (C_{1-6})alkoxy, amino, piperidyl, guanidino or amidino optionally N-substituted by one or two (C_{1-6})alkyl, acyl or (C_{1-6})alkylsulphonyl groups, NH_2CO, hydroxy, thiol, (C_{1-6})alkylthio, heterocyclylthio, heterocyclyloxy, arylthio, aryloxy, acylthio, acyloxy or (C_{1-6})alkylsulphonyloxy; (C_{1-6})alkoxy-substituted (C_{1-6})alkyl; halogen; (C_{1-6})alkyl; (C_{1-6})alkylthio; nitro; azido; acyl; acyloxy; acylthio; (C_{1-6})alkylsulphonyl; (C_{1-6})alkylsulphoxide; arylsulphonyl; arylsulphoxide or an amino, piperidyl, guanidino or amidino group optionally N-substituted by one or two (C_{1-6})alkyl, acyl or (C_{1-6})alkylsulphonyl groups, or when one of Z^1, Z^2, Z^3, Z^4 and Z^5 is N, R^1 may instead be hydrogen;

R^{1a} is selected from H and the groups listed above for R^1;

R^3 is hydrogen; or
R^3 is in the 2- or 3-position and is:
carboxy; (C_{1-6})alkoxycarbonyl; aminocarbonyl wherein the amino group is optionally substituted by hydroxy, (C_{1-6})alkyl, hydroxy(C_{1-6})alkyl, aminocarbonyl(C_{1-6})alkyl, (C_{2-6})alkenyl, (C_{1-6})alkylsulphonyl, trifluoromethylsulphonyl, (C_{1-6})alkenylsulphonyl, (C_{1-6})alkoxycarbonyl, (C_{1-6})alkylcarbonyl, (C_{2-6})alkenyloxycarbonyl or (C_{2-6})alkenylcarbonyl and optionally further substituted by (C_{1-6})alkyl, hydroxy(C_{1-6})alkyl, aminocarbonyl(C_{1-6})alkyl or (C_{2-6})alkenyl; cyano; tetrazolyl; 2-oxo-oxazolidinyl optionally substituted by R^{10}; 3-hydroxy-3-cyclobutene-1,2-dione-4-yl; 2,4-

thiazolidinedione-5-yl; tetrazol-5-ylaminocarbonyl; 1,2,4-triazol-5-yl optionally substituted by R^{10}; or 5-oxo-1,2,4-oxadiazol-3-yl; or

R^3 is in the 2- or 3-position and is (C_{1-4})alkyl or ethenyl substituted with any of the groups listed above for R^3 and/or 0 to 3 groups R^{12} independently selected from:

thiol; halogen; (C_{1-6})alkylthio; trifluoromethyl; azido; (C_{1-6})alkoxycarbonyl; (C_{1-6})alkylcarbonyl; (C_{2-6})alkenyloxycarbonyl; (C_{2-6})alkenylcarbonyl; hydroxy optionally substituted by (C_{1-6})alkyl, (C_{2-6})alkenyl, (C_{1-6})alkoxycarbonyl, (C_{1-6})alkylcarbonyl, (C_{2-6})alkenyloxycarbonyl, (C_{2-6})alkenylcarbonyl or aminocarbonyl wherein the amino group is optionally substituted by (C_{1-6})alkyl, (C_{2-6})alkenyl, (C_{1-6})alkylcarbonyl or (C_{2-6})alkenylcarbonyl; amino optionally mono- or disubstituted by (C_{1-6})alkoxycarbonyl, (C_{1-6})alkylcarbonyl, (C_{2-6})alkenyloxycarbonyl, (C_{2-6})alkenylcarbonyl, (C_{1-6})alkyl, (C_{2-6})alkenyl, (C_{1-6})alkylsulphonyl, (C_{2-6})alkenylsulphonyl or aminocarbonyl wherein the amino group is optionally substituted by (C_{1-6})alkyl or (C_{2-6})alkenyl; aminocarbonyl wherein the amino group is optionally substituted by (C_{1-6})alkyl, hydroxy(C_{1-6})alkyl, aminocarbonyl(C_{1-6})alkyl, (C_{2-6})alkenyl, (C_{1-6})alkoxycarbonyl, (C_{1-6})alkylcarbonyl, (C_{2-6})alkenyloxycarbonyl or (C_{2-6})alkenylcarbonyl and optionally further substituted by (C_{1-6})alkyl, hydroxy(C_{1-6})alkyl, aminocarbonyl(C_{1-6})alkyl or (C_{2-6})alkenyl; oxo; (C_{1-6})alkylsulphonyl; (C_{2-6})alkenylsulphonyl; or (C_{1-6})aminosulphonyl wherein the amino group is optionally substituted by (C_{1-6})alkyl or (C_{2-6})alkenyl;
provided that when R^3 is disubstituted with hydroxy or amino and carboxy containing substituents these may optionally together form a cyclic ester or amide linkage, respectively;

wherein R^{10} is selected from (C_{1-4})alkyl; (C_{2-4})alkenyl; aryl; a group R^{12} as defined above; carboxy; aminocarbonyl wherein the amino group is optionally substituted by hydroxy, (C_{1-6})alkyl, (C_{2-6})alkenyl, (C_{1-6})alkylsulphonyl, trifluoromethylsulphonyl, (C_{1-6})alkenylsulphonyl, (C_{1-6})alkoxycarbonyl, (C_{1-6})alkylcarbonyl, (C_{2-6})alkenyloxycarbonyl or (C_{2-6})alkenylcarbonyl and optionally further substituted by (C_{1-6})alkyl or (C_{2-6})alkenyl; cyano; or tetrazolyl;

R^4 is a group $-CH_2-R^5$ in which R^5 is selected from:

(C_{3-12})alkyl; hydroxy(C_{3-12})alkyl; (C_{1-12})alkoxy(C_{3-12})alkyl; (C_{1-12})alkanoyloxy(C_{3-12})alkyl; (C_{3-6})cycloalkyl(C_{3-12})alkyl; hydroxy-, (C_{1-12})alkoxy- or (C_{1-12})alkanoyloxy-(C_{3-6})cycloalkyl(C_{3-12})alkyl; cyano(C_{3-12})alkyl; (C_{2-12})alkenyl; (C_{2-12})alkynyl; tetrahydrofuryl; mono- or di-(C_{1-12})alkylamino(C_{3-12})alkyl;

acylamino(C_{3-12})alkyl; (C_{1-12})alkyl- or acyl-aminocarbonyl(C_{3-12})alkyl; mono- or di-(C_{1-12})alkylamino(hydroxy) (C_{3-12})alkyl; optionally substituted phenyl(C_{1-2})alkyl, phenoxy(C_{1-2})alkyl or phenyl(hydroxy)(C_{1-2})alkyl; optionally substituted diphenyl(C_{1-2})alkyl; optionally substituted phenyl(C_{2-3})alkenyl; optionally substituted benzoyl or benzoyl(C_{1-3})alkyl; optionally substituted heteroaryl or heteroaryl(C_{1-2})alkyl;and optionally substituted heteroaroyl or heteroaroylmethyl;

n is 0, 1 or 2;
AB is $NR^{11}CO$, CO-CR^8R^9 or CR^6R^7-CR^8R^9 or when n is 1 or 2, AB may instead be O-CR^8R^9 or NR^{11}-CR^8R^9, or when n is 2 AB may instead be CR^6R^7-NR^{11} or CR^6R^7-O, provided that when n is 0, B is not CH(OH),
and wherein:
each of R^6 and R^7 R^8 and R^9 is independently selected from: H; thiol; (C_{1-6})alkylthio; halo; trifluoromethyl; azido; (C_{1-6})alkyl; (C_{2-6})alkenyl; (C_{1-6})alkoxycarbonyl; (C_{1-6})alkylcarbonyl; (C_{2-6})alkenyloxycarbonyl; (C_{2-6})alkenylcarbonyl; hydroxy, amino or aminocarbonyl optionally substituted as for corresponding substituents in R^3; (C_{1-6})alkylsulphonyl; (C_{2-6})alkenylsulphonyl; or (C_{1-6})aminosulphonyl wherein the amino group is optionally substituted by (C_{1-6})alkyl or (C_{1-6})alkenyl;
or R^6 and R^8 together represent a bond and R^7 and R^9 are as above defined;
and each R^{11} is independently H, trifluoromethyl, (C_{1-6})alkyl, (C_{1-6})alkenyl, (C_{1-6})alkoxycarbonyl, (C_{1-6})alkylcarbonyl, aminocarbonyl wherein the amino group is optionally substituted by (C_{1-6})alkoxycarbonyl, (C_{1-6})alkylcarbonyl, (C_{1-6})alkenyloxycarbonyl, (C_{2-6})alkenylcarbonyl, (C_{1-6})alkyl or (C_{1-6})alkenyl and optionally further substituted by (C_{1-6})alkyl or (C_{1-6})alkenyl;

or where one of R^3 and R^6, R^7, R^8 or R^9 contains a carboxy group and the other contains a hydroxy or amino group they may together form a cyclic ester or amide linkage.

2. A compound according to claim 1 wherein Z^5 is CH or N, Z^3 is CH or CF and Z^1, Z^2 and Z^4 are each CH, or Z^1 is N, Z^3 is CH or CF and Z^2, Z^4 and Z^5 are each CH..

3. A compound according to claim 1 or 2 wherein R^1 is methoxy, amino(C_{3-5})alkyloxy, guanidino(C_{3-5})alkyloxy, piperidyl(C_{3-5})alkyloxy, nitro or fluoro.

4. A compound according to any preceding claim wherein R^3 is hydrogen, (C_{1-4}) alkyl, ethenyl, optionally substituted 1-hydroxy-(C_{1-4}) alkyl, or R^3 contains carboxy,

optionally substituted aminocarbonyl, cyano or 2-oxo-oxazolidinyl optionally substituted by R^{10} and is in the 3-position.

5. A compound according to any preceding claim wherein n is 0 and either A is CHOH and B is CH_2 or A is NH and B is CO.

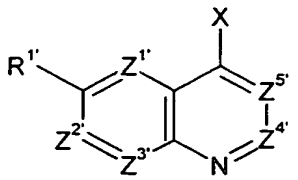
6. A compound according to any preceding claim wherein R^4 is (C_{5-10})alkyl, unsubstituted phenyl(C_{2-3})alkyl or unsubstituted phenyl(C_{3-4})alkenyl.

7. A compound according to claim 1 selected from:
[2S]-1-Heptyl-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]-2-hydroxymethylpiperazine
[2R]-1-Heptyl-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]-2-hydroxymethylpiperazine
[2S]-1-Heptyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]-2-hydroxymethylpiperazine dioxalate
[2S]-1-Heptyl-4-[2-(S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]-2-hydroxymethylpiperazine dioxalate
[2R]-1-Heptyl-4-[2-(S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]-2-hydroxymethylpiperazine dioxalate
[2R]-1-Heptyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]-2-hydroxymethylpiperazine dioxalate
[2R,S]-1-Heptyl-2-hydroxyethyl-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine
[2R,S]-2-Carboxymethyl-1-heptyl-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine trihydrochloride
[2S]-2-Carboxymethyl-1-heptyl-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine trihydrochloride
[2R]-2-Carboxymethyl-1-heptyl-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine trihydrochloride
[3R]-3-Carboxymethyl-1-heptyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine tris(trifluoroacetate)
[3S]-1-Heptyl-3-[2-hydroxyethyl]-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine dioxalate
[2S]-1-Heptyl-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]-2-hydroxyaminocarbonylmethylpiperazine

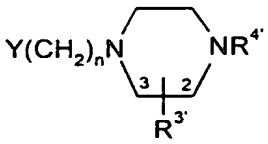
[2R]-1-Heptyl-2-cyanomethyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine dioxalate
[2R]-1-Heptyl-2-[2-aminoethyl]-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine dioxalate
1-Heptyl-4-[3-(6-methoxyquinolin-4-yl)propylpiperazine]
1-Heptyl-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine
1-Heptyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine oxalate
1-Heptyl-4-[2-(S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine oxalate
1-Octyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine oxalate
1-Hexyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine oxalate]
1-(5-Methyl-1-hexyl)-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine oxalate
1-Heptyl-4-[N-(6-methoxyquinolin-4-yl)formamido]piperazine
[9aS, 3S]-3-(6-methoxyquinolin-4-yl)-8-heptylhexahydro-pyrazino [2,1-c][1,4]oxazin-3(4H)-one
[9aS,3R]-3-(6-methoxyquinolin-4-yl)-8-heptylhexahydro pyrazino[2,1-c][1,4]oxazin-3(4H)-one
[9aR,3R]-(6-methoxy quinolin-4-yl)-8-heptylhexahydro-pyrazino[2,1-c][1,4]oxazine-3(4H)-one
[9aR,3S]-3-(6-methoxy quinolin-4-yl)-8-heptylhexahydropyrazino[2,1-c][1,4]oxazine-3(4H)-one
[3R]-1-Heptyl-3-[2-hydroxyethyl]-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine oxalate
[3R]-1-Heptyl-3-hydroxymethyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine
[3S]-1-Heptyl-3-hydroxymethyl-4-[2-(S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine
[3S]-1-Heptyl-3-hydroxymethyl-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine
[3R]-1-Heptyl-3-hydroxymethyl-4-[2-(S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine
1-(3-phenoxypropyl)-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine
1-[3-(3,4-Dimethoxyphenyl)-propyl]-4-[2-(R,S)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine
1-[3-(1,3-Dihydro-2-oxobenzimidazol-1-yl)-propyl]-4-[2-(R)-hydroxy-2-(6-methoxyquinolin-4-yl)ethyl]piperazine

8. A process for preparing compounds of formula (I), or a pharmaceutically acceptable derivative thereof according to claim 1, which process comprises:

(a) reacting a compound of formula (IV) with a compound of formula (V):



(IV)



(V)

wherein Z^1, Z^2, Z^3, Z^4 and Z^5, m, n, R^1, R^3 and R^4 are as defined in formula (I), and X and Y may be the following combinations:

(i) X is M and Y is $CH_2CO_2R^x$, CH_2CHO or CH_2COW
(ii) X is CO_2R^y and Y is $CH_2CO_2R^x$
(iii) one of X and Y is $CH{=}SPh_2$ and the other is CHO
(iv) X is CH_3 and Y is CHO
(v) X is CH_3 and Y is CO_2R^x
(vi) X is $CH_2CO_2R^y$ and Y is CO_2R^x
(vii) X is $CH{=}PR^z{}_3$ and Y is CHO
(viii) X is CHO and Y is $CH{=}PR^z{}_3$
(ix) X is halogen and Y is $CH{=}CH_2$
(x) one of X and Y is COW and the other is $NHR^{11'}$ or NCO
(xi) one of X and Y is $(CH_2)_p$-W and the other is $(CH_2)_qNHR^{11'}$ or $(CH_2)_qOH$
(xii) one of X and Y is CHO and the other is $NHR^{11'}$,

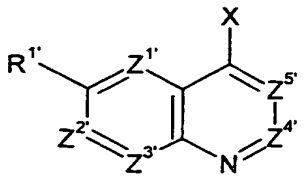
or where n=0

(xiii) X is A-B-$(CH_2)_n$-W or A-B-$(CH_2)_{n-1}$-CHO and Y is H
(xiv) X is NCO and Y is H
(xv) X is CH_3 and Y is H
(xvi) X is $COCH_2W$ and Y is H
(xvii) X is $CH{=}CH_2$ and Y is H
(xviii) X is oxirane and Y is H

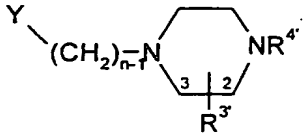
in which W is a leaving group, R^x and R^y are (C_{1-6})alkyl and R^z is aryl or (C_{1-6})alkyl;

or

(b) reacting a compound of formula (IV) with a compound of formula (Vb):



(IV)



(Vb)

wherein Z^1, Z^2, Z^3, Z^4 and Z^5, m, n, R^1, R^3 and R^4 are as defined in formula (I), X is $CH_2NHR^{11'}$ and Y is CHO or COW;

in which $Z^{1'}$, $Z^{2'}$, $Z^{3'}$, $Z^{4'}$, $Z^{5'}$, $R^{11'}$, $R^{1'}$, $R^{3'}$ and $R^{4'}$ are Z^1, Z^2, Z^3, Z^4, Z^5, R^{11}, R^1, R^3 and R^4 or groups convertible thereto, and thereafter optionally or as necessary converting $Z^{1'}$, $Z^{2'}$, $Z^{3'}$, $Z^{4'}$, $Z^{5'}$, $R^{11'}$, $R^{1'}$, $R^{3'}$ and $R^{4'}$ to Z^1, Z^2, Z^3, Z^4, Z^5, $R^{11'}$, R^1, R^3 and R^4, converting A-B to other A-B, interconverting Z^1, Z^2, Z^3, Z^4, Z^5, R^{11}, R^1, R^3 and/or R^4 and forming a pharmaceutically acceptable derivative thereof.

9. A pharmaceutical composition comprising a compound of formula (I) or a pharmaceutically acceptable derivative thereof according to claim 1, and a pharmaceutically acceptable carrier.

10. A method of treatment of bacterial infections in mammals, particularly in man, which method comprises the administration to a mammal in need of such treatment of an effective amount of a compound of formula (I) or a pharmaceutically acceptable derivative thereof according to claim 1.

11. The use of a compound of formula (I) or a pharmaceutically acceptable derivative thereof according to claim 1 in the manufacture of a medicament for use in the treatment of bacterial infections in mammals.

12. A pharmaceutical composition for use in the treatment of bacterial infections in mammals comprising a compound of formula (I) or a pharmaceutically acceptable derivative thereof according to claim 1, and a pharmaceutically acceptable carrier.